

35. The method according to claim 34, wherein said substrate is not a primary metabolite of the group selected from glucose, amino acids, common fatty acids and nucleotides.

36. The method according to claim 34, wherein said nucleic acid sequence is under the control of a tissue selective promoter.

37. The method according to claim 36, wherein said promoter is seed selective.

38. The method according to claim 37, wherein said seed selective promoter is a phaseolin promoter or a napin promoter.

39. The method according to claim 34 wherein said encoded protein is a heterologous enzyme.

40. A method for altering a nutritional profile of a plant, comprising the steps of:
selecting a nucleic acid sequence for its ability to encode a protein capable of modifying the utilization of a substrate in the phenylpropanoid pathway of said plant;

transforming a plant cell of said plant with an expression cassette comprising said nucleic acid sequence; and

recovering a genetically altered plant from said plant cell, said genetically altered plant characterized by an altered nutritional profile relative to a wild-type of said plant.

41. The method according to claim 40, wherein said encoded protein is a choline metabolizing enzyme.

42. The method according to claim 41, wherein said choline metabolizing enzyme is choline oxidase.

43. The method according to claim 42, wherein said nucleic acid sequence encoding said choline oxidase is under the control of a seed-selective promoter active in plant cells, and wherein said expression cassette further comprises a nucleic acid sequence that encodes a betaine aldehyde dehydrogenase capable of converting betaine aldehyde to betaine, said betaine aldehyde dehydrogenase encoding nucleic acid sequence being under the control of a seed-selective promoter active in plant cells.

44. The method according to claim 34, comprising the further step of:

growing said genetically altered plant under conditions that permit the formation of seed, and recovering said seed.

45. The method according to claim 34, comprising the further step of:

identifying at least one genetically altered plant having reduced sinapine content relative to a wild-type of said plant.

46. The method according to claim 34, comprising the further step of:

identifying at least one genetically altered plant having altered lignin content relative to a wild-type of said plant.

47. The method according to claim 34, wherein said genetically altered plant comprises at least one component of an animal feed.

48. The method according to claim 34 or 40, wherein said plant is of the genus *Brassica*.

49. A genetically modified cruciferous plant or a descendant thereof comprising: a recombinant nucleic acid sequence stably incorporated into the genome of said plant, said recombinant nucleic acid sequence encoding a protein which modifies the utilization of a substrate in the phenylpropanoid metabolic pathway of said plant, said plant having an improved nutritional profile relative to a wild-type of said plant.

50. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said substrate is not a primary metabolite of the group selected from glucose, amino acids, common fatty acids and nucleotides.

51. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said nucleic acid sequence is under the control of a tissue selective promoter.

52. The genetically modified cruciferous plant or descendant thereof of claim 51, wherein said promoter is seed selective.

53. The genetically modified cruciferous plant or descendant thereof of claim 52, wherein said seed selective promoter is a phaseolin promoter or a napin promoter.

54. A plant cell, plant seed, plant component or plant progeny derived from the genetically modified cruciferous plant of claim 49.

55. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said encoded protein is a choline metabolizing enzyme.

56. The genetically modified cruciferous plant or descendant thereof of claim 55, wherein said choline metabolizing enzyme is choline oxidase.

57. The genetically modified cruciferous plant or descendant thereof of claim 56, wherein said nucleic acid sequence encoding said choline oxidase is under the control of a seed-selective promoter active in plant cells, and wherein said expression cassette further comprises a nucleic acid sequence that encodes a betaine aldehyde dehydrogenase capable of converting betaine aldehyde to betaine, said betaine aldehyde dehydrogenase encoding nucleic acid sequence being under the control of a seed-selective promoter active in plant cells.

58. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said improved nutritional profile comprises an altered lignin content relative to said wild-type of said plant.

59. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said improved nutritional profile comprises a reduced sinapine content relative to said wild-type of said plant.

60. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said plant is a member of the Dicotyledoneae or Monocotyledoneae.

61. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said plant is a member of a family selected from the group consisting of Malvaceae, Linaceae, Compositae, Fabaceae, Euphorbiaceae, Gramineae and Oleaceae.

62. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said plant is a member of the family Brassicaceae (= Cruciferae).

63. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said plant is a member of a genus selected from the group consisting of *Linum*, *Gossypium*, *Glycine*, *Arachis*, *Carthamus*, *Helianthus*, *Medicago*, *Sinapis*, *Raphanus*, *Ricinus*, *Olea*, *Zea*, *Hordium*, *Triticale*, and *Oryza*.

64. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said plant is of the genus *Brassica*.

65. The genetically modified cruciferous plant or descendant thereof of claim 49, wherein said plant is *Brassica napus* or *Brassica rapa*.